

Getting your Fleet's Garage Ready for CNG Vehicles

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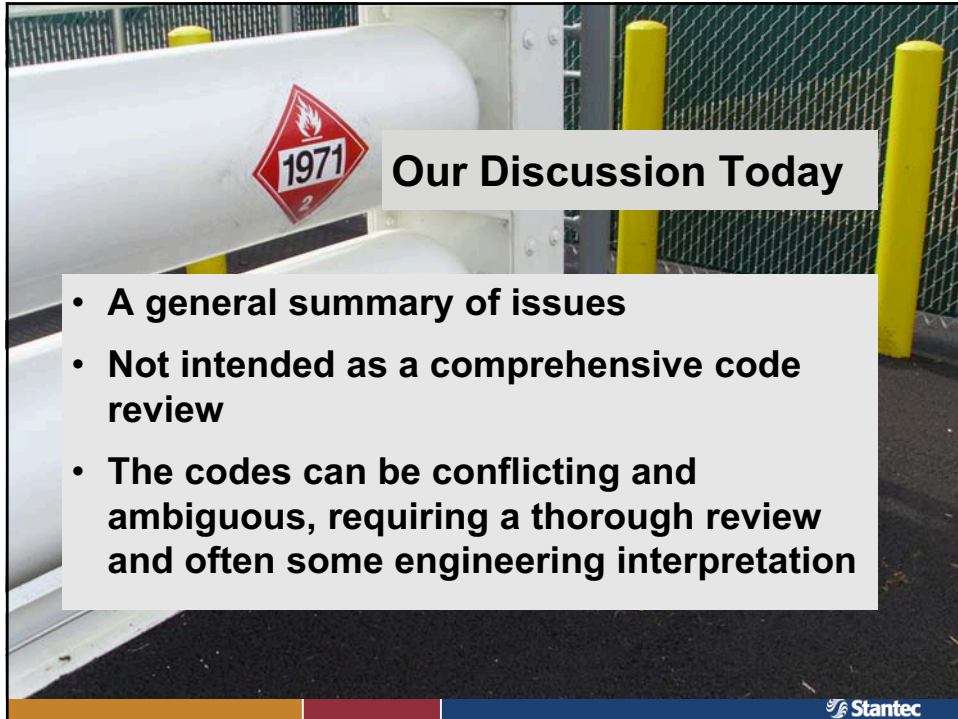
One Team. Infinite Solutions.



Our Discussion Today

- Discuss the issue – What are the requirements for CNG repair garages and how are they made safe?
- Review key national codes
- Discuss approaches to code compliance





Our Discussion Today

- A general summary of issues
- Not intended as a comprehensive code review
- The codes can be conflicting and ambiguous, requiring a thorough review and often some engineering interpretation

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Why are modifications necessary?

- Traditional hazards
 - Gasoline
 - Diesel
- CNG Hazards
 - STP properties – lighter than air
 - Explosive range is 5 – 15% - at room temperature
 - Auto-ignition Temp: 1076F

Fundamentals of Protection

- Remove sources of electrical sparks/ignition where gas is likely to be present
- Remove heat sources where gas is likely to be present
- Detect gas leaks
- Ventilate to keep gas below the LEL

Codes

National Standards

- *National Electric Code (NEC/NFPA 70)*
- *Code for Motor Fuel Dispensing Facilities and Repair Garages (NFPA 30A)*
- *Vehicular Gaseous Fuel Systems Code (NFPA 52)*
- *International Fire Code (Chapter 22)*
- *International Mechanical Code*

Electrical Requirements

National Electric Code

- National Electric Code (NEC/NFPA 70) adopted in most states either as a whole or modified – should be used as a minimum standard of care regardless
- Defines “Hazard Areas” – Class I, Division 1 and Class I Division 2
- Special protection techniques for all electrical installation in these areas
- Protection techniques include explosion-proof equipment, intrinsically safe equipment, non-incendiary equipment, hermetically sealed equipment (depending on the Division)

Electrical Requirements

National Electric Code

- At traditional motor vehicle repair garages, classified areas are low (sumps, etc.) to address accumulation of heavier than air gasoline vapors
- In CNG repair garages, classified areas are high, to address accumulation of lighter than air natural gas
- Other codes (NFPA 30A and NFPA 52) dictate in most detail where the hazard/classified areas should be
- Common implication is the electrical equipment along the ceiling often needs to be upgraded or moved



Fire Code Requirements

NFPA 30A and NFPA 52

- NFPA 30A applies at facilities where CNG is dispensed with traditional motor fuels (gasoline/diesel)
- NFPA 30A refers to NFPA 52 for design standards
- NFPA 52 applies when there are no other motor fuels at the facility.

General Requirements

NFPA 30A and NFPA 52

- Distinction between maintaining vehicles indoors and dispensing/compressing indoors
- 18" classified area along ceiling, or ventilation in lieu
- Gas detection system
 - 25% of LEL activation
 - Audible/visual alarm
 - Deactivation of all heating systems
 - Activation of mechanical exhaust
- No open flame heaters, or those with surfaces exceeding 750F

General Requirements

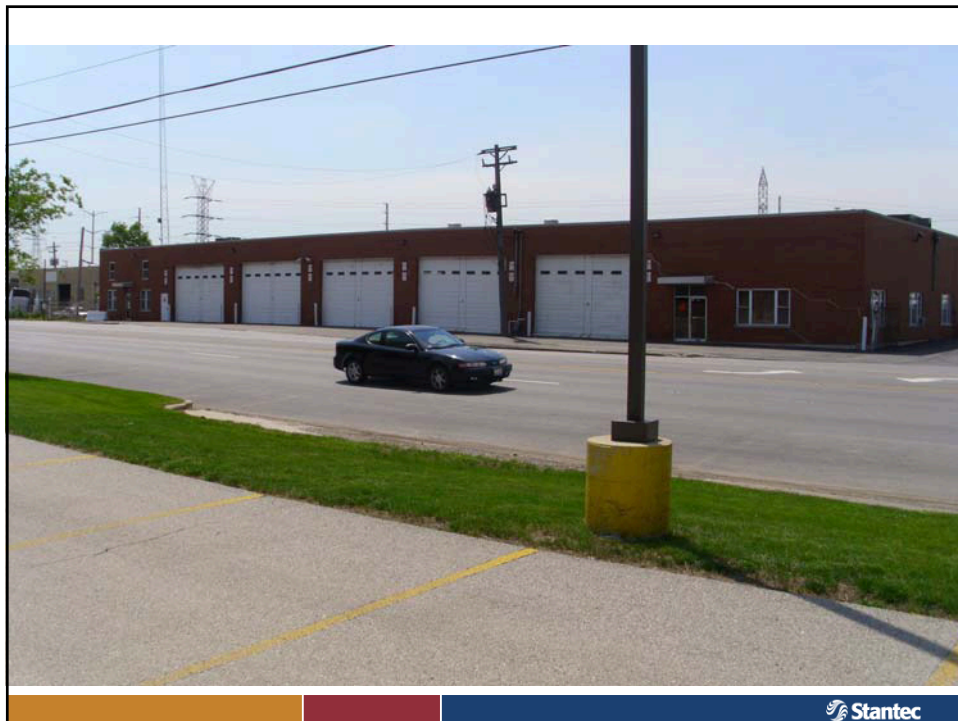
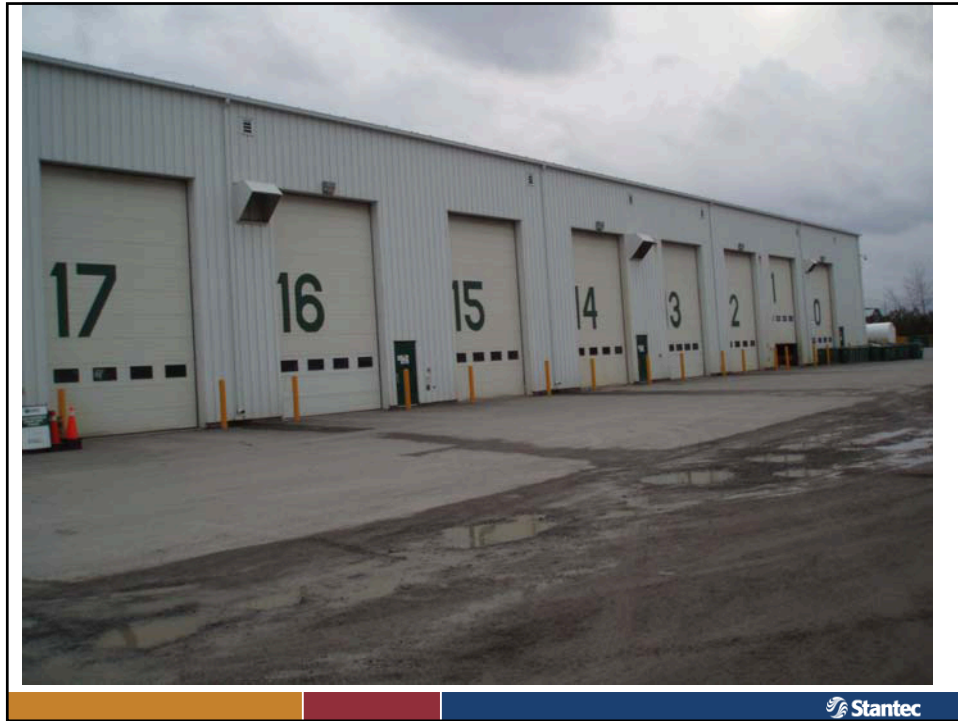
International Mechanical Code

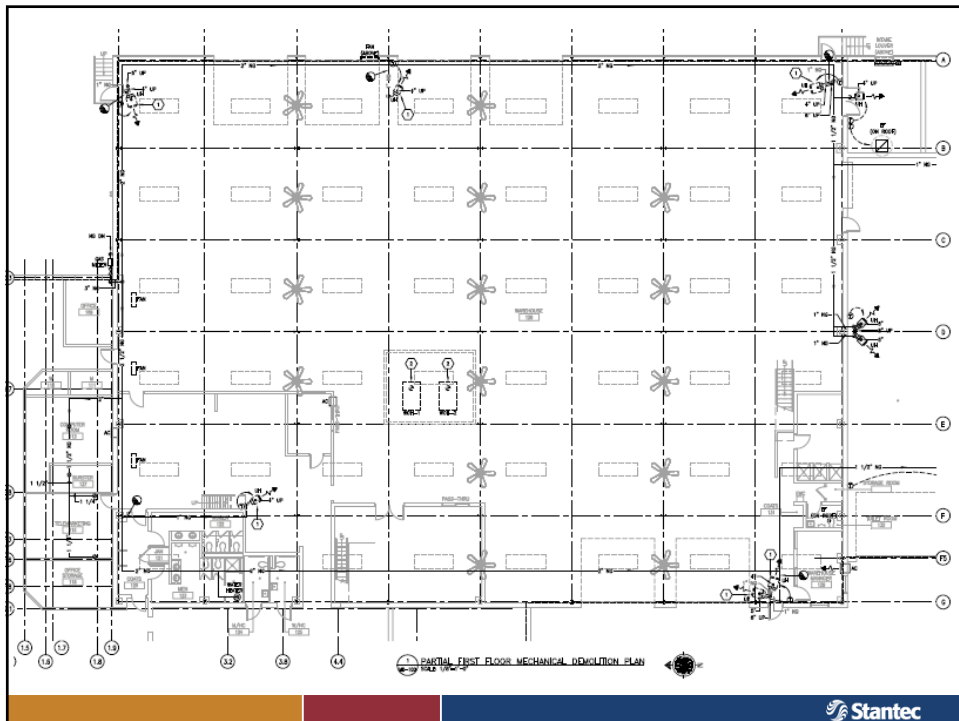
- Ventilation present that is continuous or interlocked
- Exhausting from the highest point

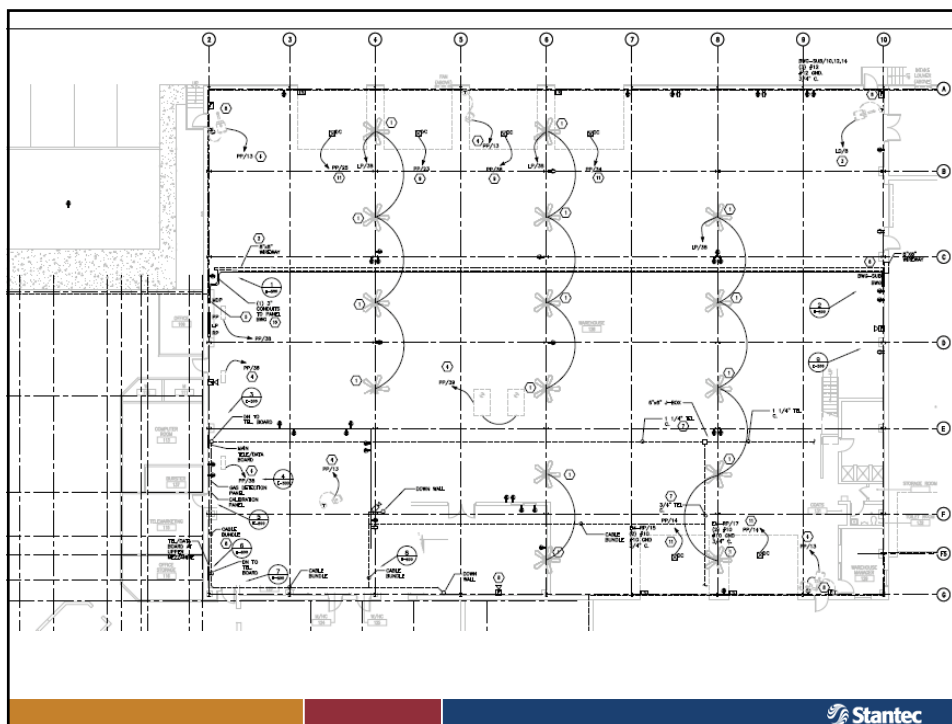
Practical Implications

- Ventilation vs. heating in cold climates often results with interlocked ventilation
- Electrical upgrades generally lower life-cycle cost than continuous ventilation of otherwise classified areas
- Often upgrades include a combination of moving equipment, sealing conduit, and adding new equipment
- Existing exhaust fans should be upgraded to explosion-proof
- Many heating systems need upgrade, as they are often open flame or exceed 750°F surface temp.

Photos – Design Examples







DISCONNECT AND REMOVE CONDUITS WITHIN CLASS I, DIVISION II AREA. PROVIDE NEW CONDUITS AND CONDUCTORS BELOW AREA (TYP FOR ALL CONDUITS IN CLASS I, DIVISION II AREA).



5 Rework at Mezzanine
E-500 Scale: NTS

REWORK CONDUITS AT WIREWAY AS NEEDED TO ACCOMMODATE LOWERING OF WIREWAY.

3" PANEL FEED TO BWG. DISCONNECT AND LOWER ENTIRE LENGTH BELOW CLASS I, DIVISION II AREA. (APPROXIMATELY 6"). REMOVE CONDUIT AND CONDUCTORS FROM PANEL BWG AND SHORTEN. REINSTALL AFTER CONDUIT IS LOWERED.

8" WIREWAY. DISCONNECT AND LOWER ENTIRE LENGTH BELOW CLASS I, DIVISION II AREA. (APPROXIMATELY 3").

DISCONNECT AND REMOVE CONDUITS WITHIN CLASS I, DIVISION II AREA. PROVIDE NEW CONDUITS AND CONDUCTORS BELOW AREA (TYP FOR ALL CONDUITS IN CLASS I, DIVISION II AREA).



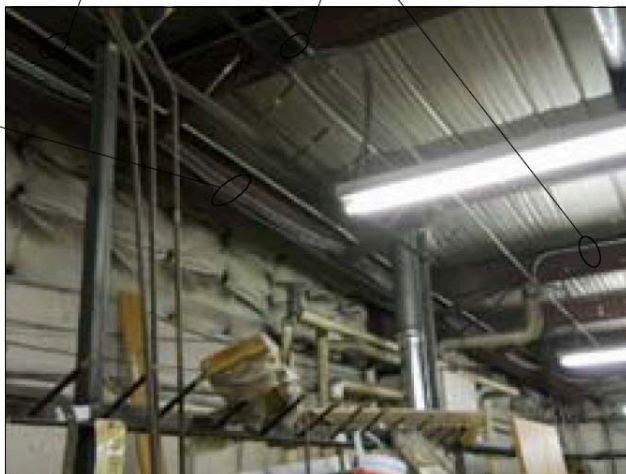
2 Rework at Panel BWG
E-500 SCALE: NTS

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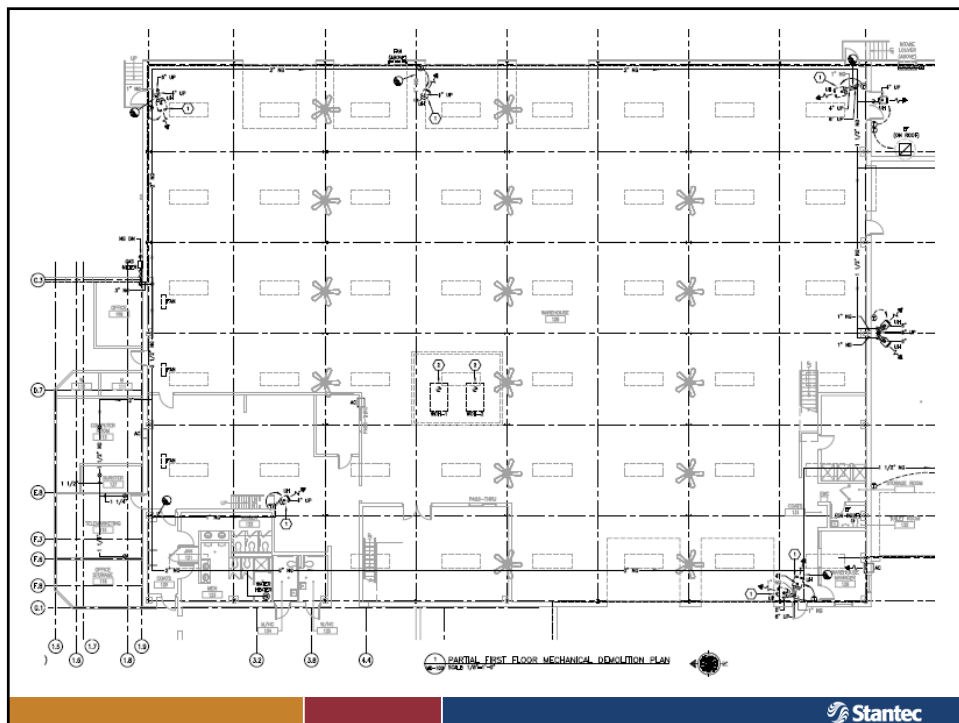
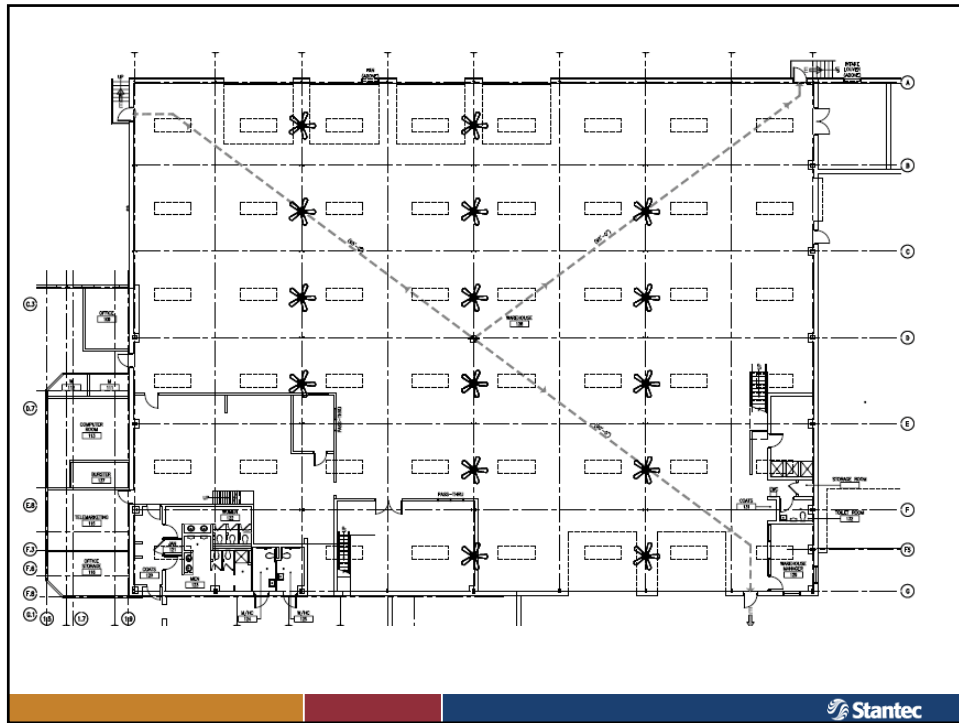
TYPICAL CONDUIT TO BE REMOVED AND RELOCATED BELOW THE CLASSIFIED AREA.

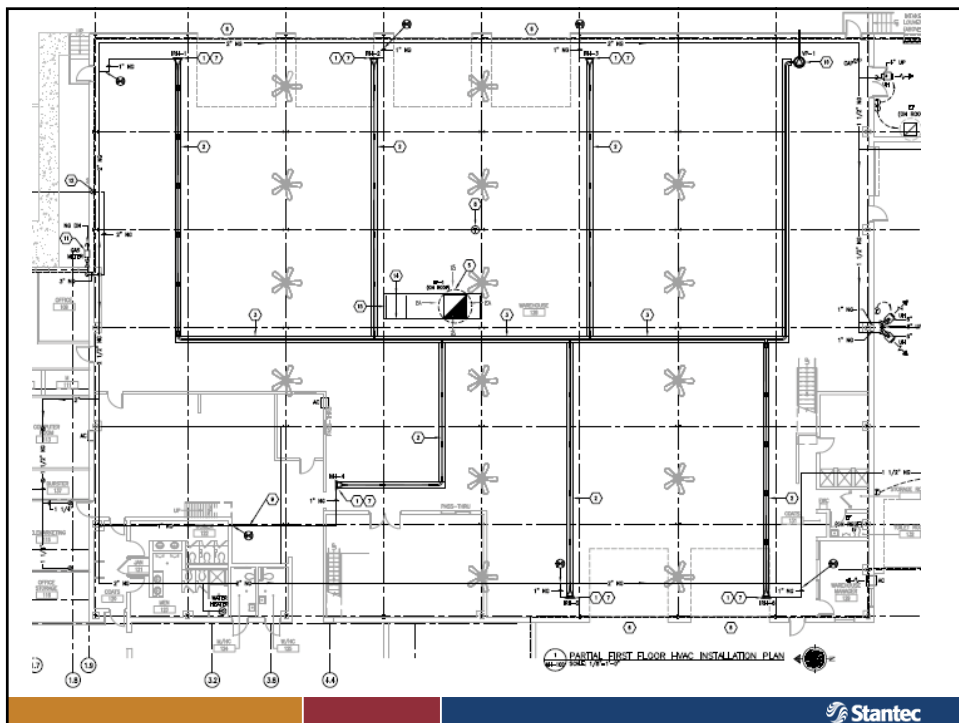
TYPICAL LIGHTING CONDUIT SYSTEM TO BE REMOVED AND RELOCATED BELOW THE CLASSIFIED AREA.

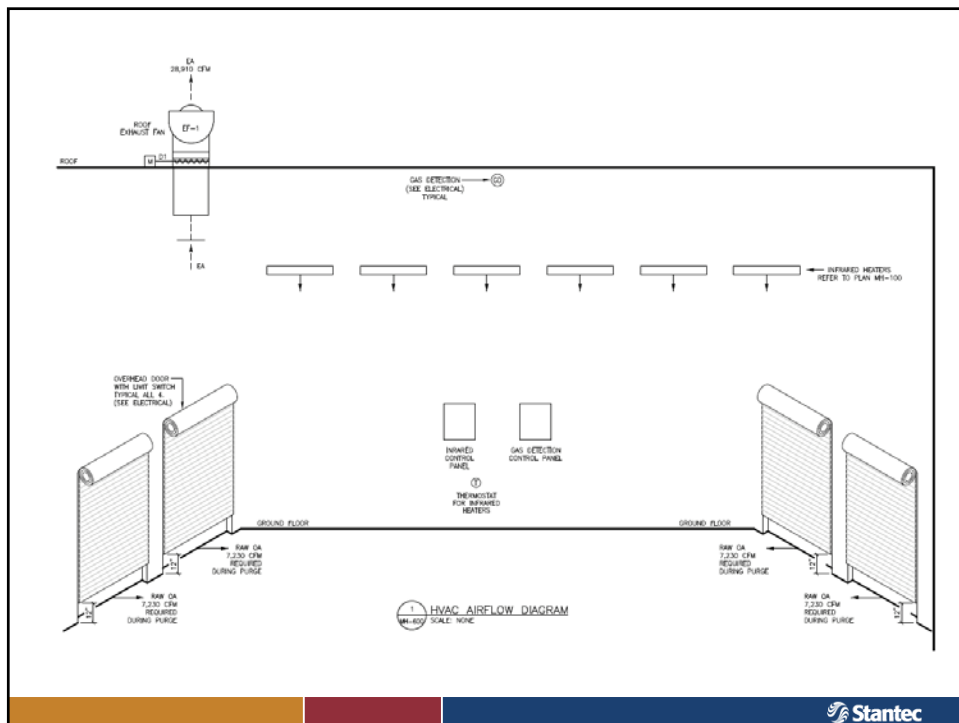
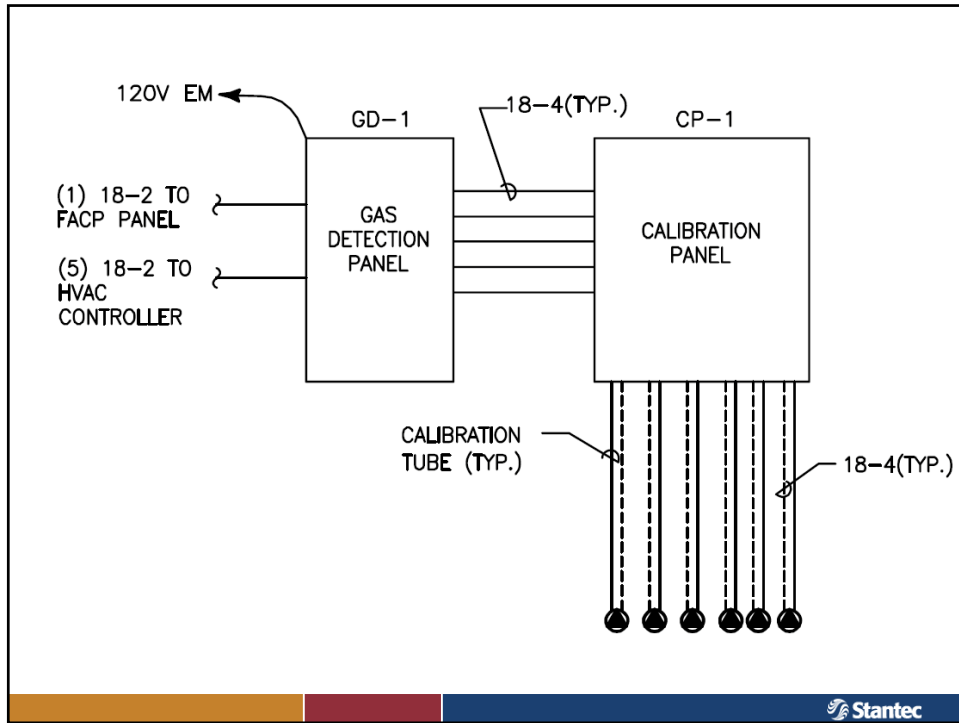
LOOSE TELEDATA CABLES IN CEILING SPACE WITHIN CLASS I, DIVISION II AREA. CABLES ORIGINATE AT MAIN OR MEZZANINE TELEPHONE BOARD. REMOVE FROM BOARD AND RELOCATE BELOW CLASSIFIED AREA



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WARNING
DOORS OPEN
AUTOMATICALLY
IN THE EVENT OF
GAS DETECTION ALARM



OVERHEAD DOOR/GAS DETECTION
SYSTEM TYPICAL INTERLOCK WIRING DIAGRAM

SCALE: NTS



QUESTIONS?

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